ABSTRACT OF THE DISCLOSURE

[0033] Present invention provides enabling techniques of integrating novel nanotube elements into semiconductor devices, particularly in transistors, as gate channels or/and as interconnects. This is done in a series of process steps, which consist of fabricating magnetic-core-containing nanotubes of selected size (diameter and length), filtration of nanotube powders, preparing nanotube precursor in aqueous chemicals to form colloidal solutions of proper concentration, dispersing nanotube-containing solutions onto wafer surface, and finally positioning nanotubes at desired locations by magnetic means to complete nanotube device structure. The key to this invention is to provide miniature nanotubes with tangible physical properties, in this case, magnetic properties, so that they can be aligned, filtered, and precisely directed to desired locations for device application. Such processes enable nanotubes to be compatible with typical semiconductor wafer processing technologies.